

NATIONAL INSTITUTES OF HEALTH
WARREN GRANT MAGNUSON CLINICAL CENTER
NURSING DEPARTMENT

PROCEDURE: Care and Maintenance of Central and Peripheral Venous Access Devices (VAD) to Include:

Dressing Change (For all VADs except PICC, Midline, and SICC)

Dressing Change (For PICC, Midline, and SICC)

Obtaining Blood Specimen Using the Double Stopcock and Vacutainer, or Syringe Method

Obtaining Blood Specimen if Discard is to be Returned

Flushing the Device

Restoring Patency of Obstructed VAD

Temporary Repair of Damaged Central VAD

Permanent Repair of Damaged Central VAD

Removal of Non-Tunneled Central VAD with or without Culture

Removal of Non-Tunneled Apheresis Catheter

Accessing Subcutaneous Central VAD

De-accessing Subcutaneous Central VAD

Antibiotic Lock Therapy

References

Appendices: VAD Occlusion Verification

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I. DRESSING CHANGE (For all VADs except PICCs, Midlines, and SICCs)

A EQUIPMENT LIST

- Mask
- Sterile barrier
- One chlorhexidine and alcohol applicator (3 mL)
- Sterile occlusive or transparent dressing
- Steri[®]-strips (for SVADs)
- One pair non-sterile gloves
- Adhesive remover (optional)
- One pair sterile gloves
- Alcohol pads
- Tape
- One protective skin barrier swabstick or pad (optional)

B. STEPS

KEY POINTS

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| <ol style="list-style-type: none">1. Put on mask2. Set up sterile field with supplies.3. Put on non-sterile gloves.4. While stabilizing catheter, remove old dressing and discard.5. Inspect the catheter exit site, surrounding skin and tunnel for skin integrity, signs and symptoms of infection, phlebitis, swelling and bleeding.6. Remove gloves.7. Put on sterile gloves.8. Clean the exit site and surrounding skin with chlorhexidine and alcohol applicator using a bidirectional scrub. Allow to dry.9. Clean catheter with alcohol pad by anchoring catheter at exit site and gently wiping from proximal to distal end of catheter.10. Swab the area, which will be underneath the dressing adhesive, with protective skin barrier. (optional)11. If necessary, sterile steri-strips may be placed on the catheter to provide stability and prevent catheter migration.12. Apply dressing over the catheter exit site. Form an occlusive seal by pinching the adhesive portion of the dressing around the catheter that extends out from the dressing.13. Loop the catheter, if length allows, and secure to skin or gauze dressing with tape. | <ol style="list-style-type: none">5. Notify prescriber of abnormal findings.6. Gloves are contaminated from handling the old dressing.7.8. Use caution in scrubbing skin to avoid dislodging catheter.9.10. Use protective skin barrier only on intact skin.13. Do not tape directly over a transparent dressing as the tape will interfere with |
|--|--|

the
dressing's one-way permeability.

14. Remove gloves and mask.
15. Label dressing with date and time of change.
- 16 Document per SOP: VAD
[http://www.cc.nih.gov/nursing/SOPVAD1201.
htm](http://www.cc.nih.gov/nursing/SOPVAD1201.htm)

II. DRESSING CHANGE (For all small gauge silastic catheters)

A. ESSENTIAL INFORMATION

- Avoid using alcohol or acetone on stat locks unless removing them
- Avoid over tightening filaments on universal stat lock. Recommend use of universal stat lock with filaments on adult patients only.

B. EQUIPMENT LIST

- Mask
- One pair non-sterile gloves
- One pair sterile gloves
- Sterile barrier
- One chlorhexidine and alcohol applicator (3 mL)
- One protective skin barrier swabstick or pad (optional)
- Sterile occlusive or transparent dressing
- Tape
- Adhesive remover (optional)
- Sterile anchoring device (Stat-lock and/or steri-strips)
- Sterile cotton tip applicator (optional)
- Tape measure
- Securing material (tubular bandage, tape, compression bandage)

C. STEPS

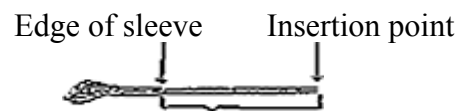
KEY POINTS

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| 1. Put on mask | |
| 2. Set up sterile field with supplies. | |
| 3. Put on non-sterile gloves. | |
| 4. Secure catheter extension and IV tubing to patient's arm or chest. | 4. Securing the extension and IV tubing prevents the catheter from migrating out when the dressing is removed. |
| 5. Instruct patient to turn face away from exposed site. | |
| 6. While stabilizing catheter, remove old dressing and anchoring device working from edges to exit site. Remove dressing in direction towards the shoulder. | 6. PICCs are usually not sutured in place and require careful removal of dressing to prevent catheter migration. A sterile cotton tip applicator placed on the catheter may help stabilize the catheter while the dressing is being removed. |
| 7. Inspect the catheter exit site, surrounding skin and track of the vein for skin and suture (if applicable) integrity, signs and symptoms of infection, phlebitis, swelling, and bleeding. | 7. Notify the MD, NP or PA of abnormal findings. Notify the PVC Service to suture SICC. |
| 8. Remove gloves. | 8. Gloves are contaminated from handling the old dressings. |
| 9. Put on sterile gloves. | |
| 10. Clean the exit site and surrounding skin with chlorhexidine and alcohol applicator using a bidirectional scrub. Allow to dry. | 10. Use caution in scrubbing to avoid dislodging catheter. |

11. Swab the area that will be underneath the dressing with protective skin barrier (optional).
12. Secure the catheter with anchoring device to provide stability and prevent catheter migration.
13. For PICCs and midlines, loop the catheter towards the shoulder, avoiding the antecubital fossa.
14. Apply transparent dressing over catheter site. Form an occlusive seal by pinching the adhesive portion of the dressing around the catheter.
15. Remove mask.
16. Measure length of the catheter from the proximal edge of the catheter sleeve to insertion site.

11. Use protective skin barrier only on intact skin.

17. If the catheter has migrated in or out > 2 cm, notify the MD, NP, or PA for possible X-ray confirmation of the catheter tip location



Measure external catheter length
between these points

18. Provide additional stability by securing the catheter extension tubing with tape, tubular bandage, or compression bandage.
19. Remove gloves and wash hands.
20. Label the dressing with the date, time, catheter size and measured length of external catheter.
21. Document per SOP
<http://www.cc.nih.gov/nursing/SOPVAD1201.htm>

18. Do not apply bandages too tightly. Do not cover insertion site. Do not tape directly over a transparent dressing, as the tape will interfere with the dressing's one-way permeability.

20. Label example: 3/27/99 – 0900 - 4 Fr. 3.6 cm

III. OBTAINING BLOOD SPECIMEN USING THE DOUBLE STOPCOCK AND VACUTAINER OR SYRINGE METHOD

A. ESSENTIAL INFORMATION

- NIH Clinical Center, Clinical Pathology and Transfusion Medicine Guide, 9th Edition, August 1995.
- PICCs smaller than 4 French are not recommended for blood draws.
- Do not use vacutainers when obtaining blood from PICCs or Midlines.

B. EQUIPMENT LIST

- Double stopcock with male luer lock
- Vacutainer holder with luer adapter attached or 10 mL syringe for obtaining blood specimens
- Blood collection tubes
- Red top tube labeled as “discard”
- Alcohol swabs
- Pre-filled syringe containing 0.9% NaCl
- Pre-filled syringe containing 100 units/mL Heparin
- Non-sterile gloves
- Smooth-edged cannula clamp (catheter may have its own clamp)
- Sterile intermittent injection cap (optional)
- Blunt syringe cannula (optional)

C. STEPS

KEY POINTS

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| <ol style="list-style-type: none">1. Assemble double stopcock system with vacutainer or syringe (See Figure 1).<ol style="list-style-type: none">a. Attach vacutainer holder or 10 mL syringe to stopcock port closest to patient and turn valve off in direction of vacutainer or syringe.b. Attach syringe of 0.9% NaCl to next port; turn valve off to female end and flush air out of stopcock.c. Attach Heparin-filled syringe to female end of stopcock.2. Put on non-sterile gloves. | <ol style="list-style-type: none">1. Using syringes smaller than 10 mL may cause increased pressure, tip malpositioning, and rupture of catheter.2. |
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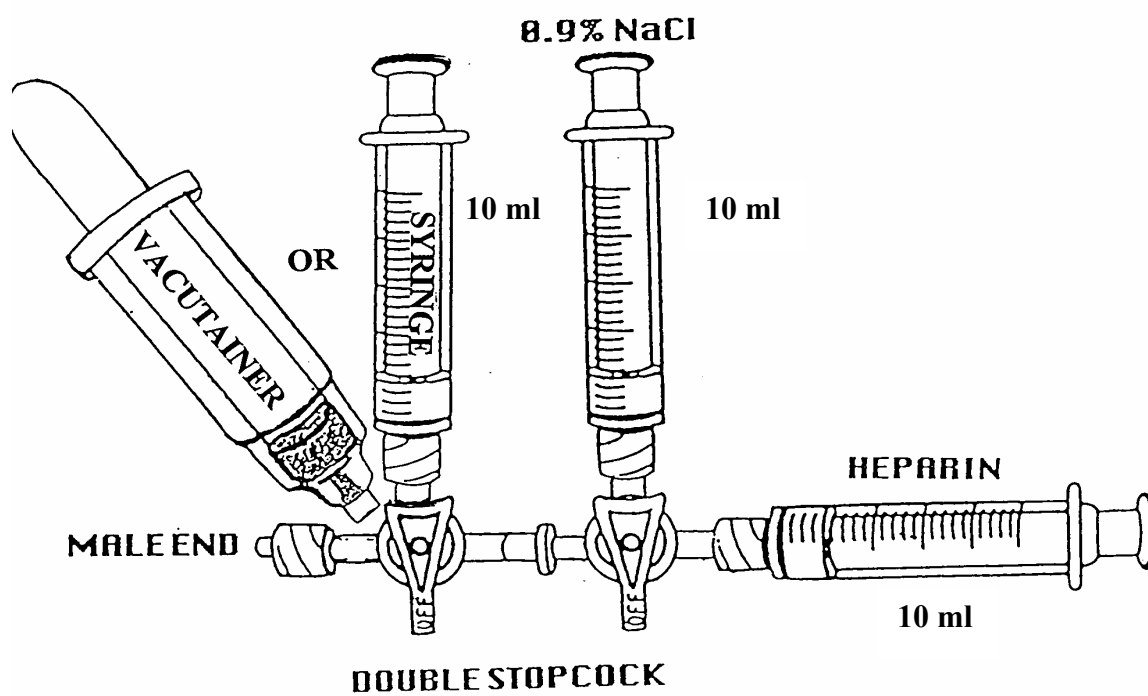
4. If drawing blood through intermittent injection cap:
 - a. Attach blunt cannula to male luer lock end of double stopcock.
 - b. Clean intermittent injection cap with alcohol and allow drying.
 - c. Insert cannula through injection cap
5. OR if drawing blood directly from catheter hub:
 - a. Clean catheter connection with alcohol;
 - b. Allow to dry; and clamp catheter (if clamp required).
 - c. Disconnect IV tubing or intermittent injection cap.
 - d. Attach male end of double stopcock to catheter hub.
6. Turn off infusions in all catheter lumen(s), if applicable, and clamp existing lumens.
7. Turn first stopcock valve off in direction of Heparin syringe. Open any existing catheter clamp.
8. Insert “discard” tube into vacutainer holder OR attach “discard” syringe, unless obtaining blood cultures. Fill tube or syringe with blood. Remove and set aside.
3. If difficulty is encountered in obtaining specimens, attach double stopcock directly to catheter hub.
6. Prevents mixing of IV infusion with blood specimens.
8. Minimum volume to discard when drawing blood through a VAD:
 - a. Blood cultures = 0 mL of blood
 - b. Coagulation (coag.) tests = 20 mL (for Heparinized lines). When possible, coordinate coag. sampling with other lab draws. Draw the other labs first and add this volume as a part of the 20-mL discard. If labs drawn do not equal 20 mL, discard the remainder of blood prior to drawing sample for coag.
 - c. Other lab tests = 5 mL
 - d. In adult patients, consult the physician if frequent coag. sampling will be required. Not to exceed 450 mL research blood withdrawal in a 6-week period. Refer to Medical Board Policy MAS M95-9
[\[http://push.cc.nih.gov/policies/PDF/M95-9.pdf\]](http://push.cc.nih.gov/policies/PDF/M95-9.pdf).
 - e. In pediatric patients utilize a closed-loop system (Figure 1) to permit reinfusion of blood.

9. Insert specimen tube(s) into vacutainer holder in appropriate sequence OR attach syringe to port closest to male end of stopcock. Withdraw appropriate amount of blood in appropriate sequence.
10. Attach additional syringes as needed. Turn stopcock valve off in direction of syringe every time syringe is removed.
11. Turn stopcock valve off in direction of vacutainer or specimen syringe.
12. Inject 0.9% NaCl solution, using the push-pause technique by making frequent pauses (push-pause) while injecting the solution.
13. Turn stopcock valve off in direction of 0.9% NaCl syringe.
14. If catheter is not to be reconnected to an infusion, fill catheter with Heparin solution using the “positive pressure” technique by closing the catheter clamp while flushing before the syringe completely empties or by maintaining pressure on the syringe plunger while withdrawing the syringe from the injection cap.
15. Clamp catheter, if clamp is required.
16. If blood was drawn through intermittent injection cap:
 - a. Remove double stopcock setup.
 - b. Clean catheter connection with alcohol.
 - c. Remove and replace intermittent injection cap.
17. OR, if blood was drawn directly from catheter hub:
 - a. Clean catheter connection with alcohol, allow to dry, and clamp catheter (if clamp required).
 - b. Remove double stopcock setup.
 - c. Connect IV tubing or intermittent injection cap.
 - d. Unclamp catheter.
18. Restart any infusion interrupted for blood draw.
9. Sequence of blood drawing: blood cultures, red top, SST tubes, then blue, green, lavender and gray. Refer to Department of Laboratory Medicine for sequence of blood drawing [http://www.cc.nih.gov/cp/using_lab_services/tubes_order_draw.html].
10. Transfer blood from syringe to collection tube(s) by adding an interlink cannula to the syringe; then connect the cannula to the vacutainer. The collection tube(s) can be inserted into the vacutainer for transfer of the blood specimen.
14. Positive pressure prevents blood from being pulled back into the catheter. Do not inject solution against a clamped catheter because this could damage the catheter.

19. Dispose of double stopcock setup and “discard” tube in a sharps container.
20. Remove gloves.
21. Document per SOP
<http://www.cc.nih.gov/nursing/SOPVA/D1201.htm>

FIGURE 1

**DOUBLE STOPCOCK SYSTEM
WITH VACUTAINER OR SYRINGE
(Closed Loop System)**



IV. OBTAINING BLOOD SPECIMEN , IF DISCARD IS TO BE RETURNED

A. ESSENTIAL INFORMATION

- Discard from CVADs locked with Heparin concentration > 100 units/mL (e.g., apheresis catheters are locked with Heparin 1000 units/mL) should not be returned.
- PICCs smaller than 4 French are not recommended for blood draws.
- When drawing blood from a PICC or flushing a PICC with 0.9% NaCl or Heparin, use only a 10 mL syringe or larger.
- Do not use vacutainers when obtaining blood from PICCs or Midlines.
- Collaborate with the medical team prior to reinfusing blood in adult patients.
- CDC guideline states that blood withdrawn prior to the sample from anywhere except a closed-loop system must be discarded.

B. EQUIPMENT LIST

- Double stopcock with male luer lock
- Vacutainer holder with luer adapter attached or 10 mL syringe for obtaining blood specimens
- Blood collection tubes
- 10 mL syringe for obtaining blood to be returned.
- Alcohol swabs
- Pre-filled syringe containing 0.9% NaCl
- Pre-filled syringe containing 100 units/mL Heparin
- Non-sterile gloves
- Smooth-edged cannula clamp (catheter may have its own clamp)
- Sterile intermittent injection cap (optional)
- Needleless syringe cannula (optional)

C. STEPS

KEY POINTS

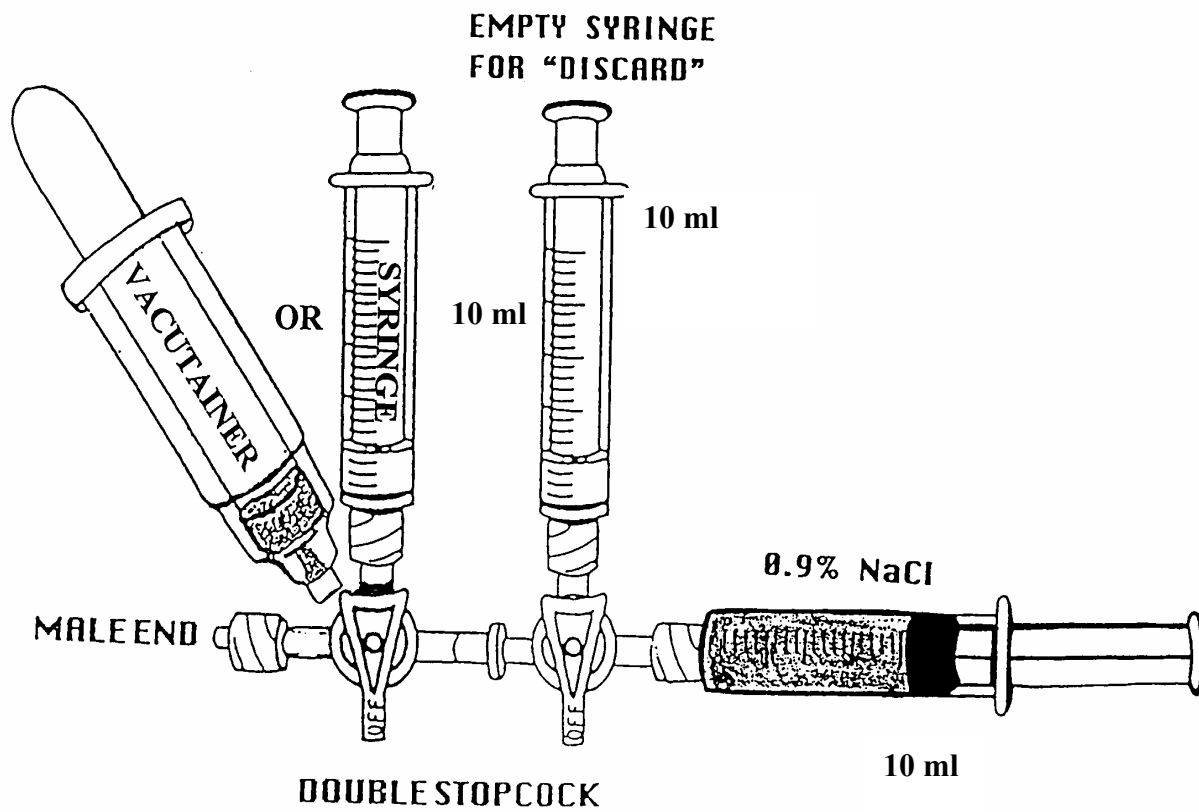
1. Assemble double stopcock system with vacutainer or syringe (Figure 2).
 2. Attach vacutainer holder or syringe for drawing blood (sampling syringe) to stopcock port closest to patient-end of the stopcock. Turn valve off in direction of vacutainer OR sampling syringe.
 3. Attach empty 10 mL syringe to next port. Turn valve off to syringe.
 4. Attach syringe of 0.9% NaCl to female end of stopcock and flush air out of stopcock. Turn valve off to 0.9% NaCl syringe
 5. Put on non-sterile gloves.
 6. If drawing blood through intermittent injection cap:
 - a. Attach needleless cannula to male Luer lock end of double stopcock.
 - b. Clean intermittent injection cap with alcohol and allow to dry.
 - c. Insert cannula through injection cap.
- OR
7. If drawing blood directly from catheter hub:
 - a. Clean catheter connection with alcohol, allow to dry, and clamp
6. If difficulty is encountered in obtaining specimens, attach double stopcock directly to catheter hub.

- catheter (if clamp required).
 - b. Disconnect IV tubing or intermittent injection cap.
 - c. Attach male end of double stopcock to Catheter hub.
 8. Turn off infusions in all catheter lumen(s), if applicable, and clamp lumen(s), if clamp required.
 9. Open catheter clamp, if present.
 10. Withdraw 5 mL of blood into discard syringe unless obtaining blood cultures.
 11. Turn first stopcock valve off in the direction of female end of stopcock.
 12. Withdraw amount of blood needed for ordered tests.
 13. Turn stopcock valve off in direction of vacutainer or sampling syringe.
 14. Reinfuse blood from discard syringe. Turn valve off in direction of discard syringe.
 15. Using push-pause technique, inject 0.9% NaCl solution for all VADs. Use “push-pause” technique by making frequent pauses (push-pause) while injecting the solution.
 16. If catheter is not to be reconnected to an infusion, fill catheter with Heparin solution using the “positive pressure” technique by closing the catheter clamp while flushing before the syringe completely empties or by maintaining pressure on the syringe plunger while withdrawing the syringe from the injection cap.
 17. Clamp catheter, if clamp required.
 18. If blood was drawn through intermittent injection cap:
 - a. Remove double stopcock setup.
 - b. Clean catheter connection with alcohol and allow to dry.
 - c. Remove and replace intermittent injection cap.
- OR
19. If blood was drawn directly from catheter hub:
 - a. Clean catheter connection with alcohol, allow to dry, and clamp catheter.
 - b. Remove double stopcock setup.
8. Prevents mixing of IV infusions with blood specimens.
 10. See III.C.8
 12. Sequence of blood drawing: blood cultures, red top, SST tubes, then blue, green, lavender and gray.
 13. Transfer blood from syringe to collection test tubes.
 14. If difficulty is encountered when obtaining blood specimens, discard blood should NOT be reinfused.
 16. Positive pressure prevents blood from being pulled back into the catheter. Do not inject solution against a clamped catheter because this could damage the catheter.

- c. Connect IV tubing or intermittent injection cap, and unclamp catheter.
 - d. Restart infusions interrupted for blood draw.
20. Dispose of double stopcock setup in a sharps container and remove gloves.
21. Document per SOP: Venous Access Devices <http://www.cc.nih.gov/nursing/SOPVAD1201.htm>.
21. For pediatric patients, document in MIS under Unit Tests or on approved Medical Records form amount of blood withdrawn.

FIGURE 2

**DOUBLE STOPCOCK AND VACUTAINER OR SYRINGE METHOD IF DISCARD IS TO BE
RETURNED
(Closed Loop System)**



V. FLUSHING THE DEVICE

A. ESSENTIAL INFORMATION

- Flushing with smaller syringe generates excessive pressure, which may cause catheter rupture or tip malposition..

B. EQUIPMENT LIST

- 10 mL syringe with blunt cannula
- Non-sterile gloves
- Alcohol prep pads
- Pre-filled syringe containing 0.9% NaCl
- Pre-filled syringe containing 100 units/mL Heparin (see VAD Consult web page at <http://www.cc.nih.gov/vads>)
- Intermittent injection cap(s)
- Single dose vial Heparin 1000 units/mL

C.	STEPS	KEY POINTS
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| <ol style="list-style-type: none">1. Clean intermittent infusion cap with alcohol and allow to dry.2. Attach 0.9% NaCl syringe.3. Unclamp catheter, if clamp in place.4. Aspirate for free flowing blood return and flush with 0.9% NaCl5. Use “push- pause” technique by making frequent pauses (push-pause) while injecting the solution.6. For apheresis/dialysis catheters, withdraw 3-5 mL blood and DISCARD because it contains concentrated heparin (1000 units/mL). Then, flush with 0.9% NaCl.7. Attach syringe of Heparin.8. Fill catheter with appropriate amount of Heparin solution using “positive pressure” technique, i.e., close the catheter clamp while flushing before the syringe completely empties or by maintaining pressure on the syringe plunger while withdrawing the syringe from the injection cap.9. Repeat for each lumen to be flushed using a separate syringe.10. Remove gloves. | <ol style="list-style-type: none">8.<ol style="list-style-type: none">a. Do not inject solution against a clamped catheter because this could damage the catheter.b. Positive pressure prevents blood from being pulled back into the catheter. |
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RESTORING PATENCY OF OBSTRUCTED VENOUS ACCESS DEVICES (VAD)

A. ESSENTIAL INFORMATION

- Review the VAD occlusion verification decision tree (Appendix A).

B. EQUIPMENT LIST

- Thrombolytic or chemical solvent
 - recombinant tissue Plasminogen Activator (rtPA): blood clot and fibrin sheath dissolution
 - Alcohol Dehydrated Absolute (Ethanol 100% absolute alcohol): 'lipid' precipitates
 - Normal Hydrochloric Acid (0.1% normal HCL): 'non-lipid' precipitates
- protective barrier
- catheter flush supplies (See Section VI)
- non-sterile gloves
- mask, gown and goggles if applicable
- One 10 mL syringes
- three-way stop cock
- injection cap
- alcohol prep pads
- 2 Pre-filled syringe containing 0.9% NaCl

C. STEPS

KEY POINTS

- | | |
|--|--|
| 1. Put on gloves | |
| 2. Verify that catheter is occluded (see Appendix A) | 2. For multi-lumen catheters, all lumens may require intervention. |
| 3. Obtain medical order for thrombolytic or chemical solvent. | 3. If administering Alcohol Dehydrated or 0.1% normal HCl, proceed to Steps 4-13. If administering rtPA, proceed to Steps 14-24. |
| Alcohol Dehydrated or 0.1% normal HCl instillation | |
| 4. Put on mask, gown and goggles to protect self from potential splashing. | |
| 5. Instruct patient to turn head away from catheter. | |
| 6. Cover the patient's face and chest with protective barrier to prevent accidental splashing on the patient's skin or eyes. | |
| 7. Wipe intermittent injection cap with alcohol pads and allow to dry. | |
| 8. If catheter will not irrigate or aspirate, gently instill agent with repeated pushing-pulling action. | |
| 9. Allow solvent to dwell for 60 minutes. | |
| 10. After dwell time is completed, clean intermittent injection cap with alcohol pad and allow to air dry. | |
| 11. Attach 10-mL syringe and attempt to aspirate the agent and blood. | 11. To ensure the withdrawal of all pharmacologic and chemical agents remaining |

12. If blood is easily aspirated, withdraw 5 mL blood into syringe and discard.

13. Using push-pause technique, irrigate catheter with 20 mL 0.9% NaCl (adults) and 10 mL 0.9% NaCl (children).

rtPA Instillation

14. Prepare rtPA-filled 10-mL syringe, and 0.9% NaCl 10-mL filled syringe

15. Using clean technique, remove catheter injection cap.

16. Attach 3-way stopcock directly to occluded lumen.

in the catheter.

12. A second dose may be required. Aspiration of first dose may not be possible and not required for instillation of second dose. Consultation with PVC Service and/or diagnostic study of catheter may also be required.

14. Pharmacy will dispense rtPA 2 mg/2mL vials. rtPA is stored as frozen vials and must be completely thawed before drawing into 10-mL syringe. Because rtPA is a protein, avoid shaking the vial; instead, gently roll it in palm of hands.

Outpatients receiving rtPA should remain in the Clinical Center (30-60minutes) however they do not have to be confined to bed. Lumen containing rtPA must be labeled as such. Instruct patient to report any signs of allergic reaction, bleeding, fever, SOB, or catheter migration/dislodgment.

Port occlusions and large (≥ 12 Fr.) open-ended catheters have priming volumes ≥ 2 mL. Add 0.9% NaCl to rtPA dose to equal catheter priming volume. Consult PVC Service if catheter priming volume cannot be determined.

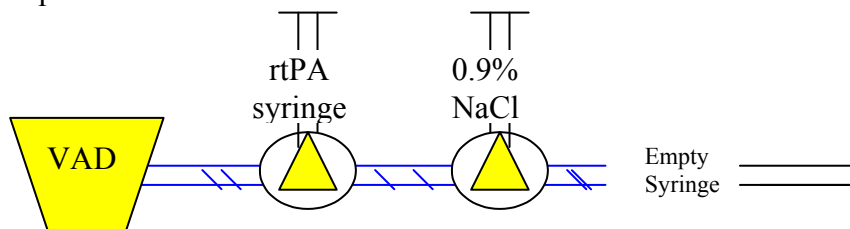
15. If applicable, catheter lumen is clamped to prevent air embolus.

16. The stopcock system is the recommended standard. If the patient needs to be out of the unit, or likely to

manipulate the system, RN can remove the syringes and cap the stopcock.

17. Attach prepared syringes (see figure #3).
 - a. Attach empty 10-mL syringe to most distal port on stopcock.
 - b. Attach rtPA-filled syringe to most proximal port of stopcock.
 - c. Attach 10-mL filled 0.9% NaCl to medial port of stopcock.
 16. Unclamp catheter, if applicable.
 17. Turn stopcock off to syringe with rtPA and open to empty syringe.
 18. Gently pull plunger back to 8 mL mark.
 19. Turn stopcock off to empty syringe and on to rtPA. Thrombolytic should flow in.
 20. Turn stopcock off to rtPA and allow to dwell undisturbed for 30 minutes - 2 hours.
 21. Open stopcock to empty syringe and attempt to aspirate.
 22. If blood return is noted, aspirate 5 mL of waste, turn off stopcock to empty syringe, open stopcock to NS syringe and flush with 10 mL NS.
 23. If lumen remains occluded after 2 hours, consult with prescriber.
 24. If catheter remains occluded after 2 doses of rtPA, consult with prescriber.
16. If medication does not flow in, gentle pressure may be applied to instill the full 2 mL. rtPA should be infused over approximately 1 minute. Slow infusion will coat the walls of the catheter and prevent denature.
 20. Can begin checking patency as soon as 30' post-instillation, but 2 hours is preferable.
 23. A second dose of rtPA may be required. Aspiration of first dose may not be possible and not required for instillation of second dose. Consultation with VAD Service and/or diagnostic study of catheter may also be required.

Figure3



25. Flush with appropriate flush solution at completion of

procedure (see Appendix A).

VIII. TEMPORARY REPAIR OF DAMAGED CENTRAL VENOUS ACCESS DEVICE

A. EQUIPMENT LIST

- Sterile 16 g. blunt cannula for large tunneled catheters, ex., Hickman OR
- Sterile 23 g. blunt cannula for small tunneled catheters, ex., Broviac catheter
- sterile intermittent injection cap
- Sterile scissors
- mask
- 10-mL syringe
- Pre-filled syringe containing 0.9% NaCl.
- Pre-filled syringe containing 100units/mL Heparin
- 2 alcohol swabs
- 2 sterile barriers
- 2 inch tape
- Smooth edged catheter clamp (catheter may have own clamp)
- Sterile gloves
- Non-sterile gloves

B. STEPS

KEY POINTS

1. Clamp catheter with smooth edged catheter clamp near the skin exit site.
 2. Explain to patient that this repair is temporary and that a permanent repair will be performed as soon as possible.
 3. Put on mask.
 4. Prepare sterile field with the following:
 - a. Sterile scissors
 - b. Intermittent infusion cap
 - c. Pre-filled 10 mL syringe with blunt cannula
 - d. 16 g. or 23 g. blunt cannula
 5. Open second sterile barrier and place on patient's chest.
 6. Using an alcohol swab, clean the portion of the catheter to be repaired. Repeat twice. Place the catheter on the sterile barrier.
 7. Put on sterile gloves.
 8. Using sterile scissors cut catheter at a 90-degree angle close to the damaged area leaving as much catheter length as possible.
 9. Insert blunt end needle into catheter as far as possible without forcing. Secure connections with tape.
 10. Attach intermittent injection cap to hub of blunt end needle.
 11. Attach syringe of 0.9% NaCl to intermittent injection cap.
4. A 16 gauge blunt end needle will fit most Hickman catheters. For a Broviac catheter, a 23 gauge blunt end needle can be used.
 5. Do not place catheter on sterile barrier yet.
 8. The length of the remaining catheter must be sufficient to allow permanent repair.
 9. Forceful pressure may further damage the catheter.

12. Unclamp catheter and aspirate for blood return.
 13. Flush with appropriate amount of 0.9% NaCl using “push-pause” technique.
 14. Reclamp catheter.
 15. For patients receiving continuous infusion, reconnect IV tubing to catheter. Unclamp catheter and regulate IV infusion to prescribed rate.
 16. If catheter is not to be reconnected to an infusion, fill catheter with appropriate amount of Heparin flush solution using the “positive pressure” technique, i.e., close catheter clamp while flushing before the syringe completely empties OR maintain pressure on the syringe plunger while withdrawing syringe from injection cap.
 17. Remove gloves and mask.
 18. Plan for permanent catheter repair.
 19. Document per SOP
<http://www.cc.nih.gov/nursing/SOPVAD1201.htm>
16. Positive pressure prevents blood from being pulled back into the catheter. Do not inject solution against a clamped catheter because this could damage the catheter.

IX. PERMANENT REPAIR OF DAMAGED CENTRAL VENOUS ACCESS DEVICES

STEPS

1. Obtain repair kit from Central Hospital Supply.
2. Follow enclosed manufacturer's instructions for use.
3. Collaborate with prescriber regarding need for Chest X-Ray to verify tip location.
4. Document per SOP
<http://www.cc.nih.gov/nursing/SOPVAD1201.htm>

STEPS

X. REMOVAL OF A NON-TUNNELED CENTRAL VENOUS CATHETER WITH OR WITHOUT CULTURE

A. EQUIPMENT

- Sterile, disposable suture removal set
- Sterile Scissors (if culturing catheter tip)
- Non-sterile gloves
- 4 X 4s (2 pkg.)
- One chlorhexidine and alcohol applicator (3 mL)
- Sterile gloves
- Occlusive dressing
- Sterile drape/barrier
- Sterile specimen container (if culturing catheter)

B. STEPS

KEY POINTS

1. Have the patient lay in bed or outpatient chair as flat as possible.
 2. Set up sterile field and put on non-sterile gloves.
 3. Remove the CVAD dressing.
 4. Remove gloves.
 5. Put on second pair sterile gloves. Clean exit site around the catheter insertion and sutures with chlorhexidine and alcohol applicator using a bidirectional scrub. Allow to dry.
 6. Remove the sutures.
 7. Instruct patient to perform valsalva maneuver or hold breath while slowly and steadily withdrawing catheter.
 8. Apply firm pressure to the catheter exit site until hemostasis has been achieved.
 9. Inspect catheter to be sure it was removed in its entirety.
 10. To remove a PICC:
 - a. grasp the catheter just below the hub, then withdraw the PICC using a constant downward motion, away from the body toward the patient's hand.
 - b. If resistance is encountered, discontinue catheter withdrawal. Reposition patient's arm and try again.
 - c. Cover the insertion site with a temporary sterile dressing and apply a warm pack to the upper arm for 15-30 minutes to relax the spasm and allow easier catheter removal.
 - d. Then try again to remove.
 11. If the catheter tip is to be cultured, hold it
7. If resistance is met pulling the catheter, stop and notify the physician.
 9. If uncertain that entire catheter was removed, measure length and compare against that recorded in medical record.
 10. In order to minimize venous spasm, do not apply direct pressure on the insertion site during PICC removal.

over sterile specimen container and cut a two (2) inch segment of the tip. Cover the container.

12. Apply pressure to the exit site for 5-10 minutes or until venous stasis has occurred. After venous stasis has occurred, maintain pressure on exit site and use an alcohol swab to gently clean around the area for any residual blood, etc.
 13. Cover with a sterile occlusive pressure dressing.
 14. The patient must remain in the bed at rest for at least 15 minutes after the catheter is removed. Instruct patient to leave dressing in place for 24 hours.
 15. Document per SOP
<http://www.cc.nih.gov/nursing/SOPVAD1201.htm>
13. Pressure dressing to remain intact 24 hours.

XI. REMOVAL OF NON-TUNNELED APHERESIS and DIALYSIS CATHETERS

A. EQUIPMENT

- Sterile, disposable suture removal set (optional)
- Sterile Scissors (if culturing catheter tip)
- Non-sterile gloves
- 4 X 4s (2 pkg.)
- One chlorhexidine and alcohol applicator (3 mL)
- Sterile gloves
- Occlusive dressing
- Sterile drape/barrier
- Sterile specimen container (if culturing catheter)

B. STEPS

KEY POINTS

1. Have the patient lay in bed as flat as possible.
 2. Set up sterile field and put on non-sterile gloves.
 3. Remove the dressing.
 4. Remove gloves.
 5. Put on sterile gloves
 6. Cleanse the exit site area around the catheter insertion and sutures with chlorhexidine and alcohol applicator using a bidirectional scrub. Allow to dry.
 7. Remove sutures or other anchoring device.
 8. Fold (2) 4x4 gauze pads in half and place over the catheter exit site.
 9. While holding pressure over the site, slowly and steadily remove the catheter.
 10. When catheter is out, continue to hold pressure over the site for 15 minutes by the clock.
 11. After the 15-minute period, gently remove the top gauze and check for any continued oozing from the site.
 12. Once hemostasis is assured, apply a pressure dressing as follows:
 - a. Open 2 packages 4 X 4 gauze and fold into quarters, creating a very thick, bulky dressing.
 - b. Place this over the catheter exit site and secure in place with pressure dressing tape, stretching the tape over the gauze.
 13. The patient must remain in bed for the following time periods:
 - a. 30 minutes for subclavian and internal jugular apheresis catheters
 - b. 2 hours for femoral apheresis
11. If bleeding is noted, continue to apply pressure, checking at 5-minute intervals until hemostasis has occurred.
 12. This will create an occlusive dressing with pressure exerted downward over the site.
 13. These patients must remain as flat in bed as possible for this time. Log rolling to the side is permitted, but the groin must be kept flat without flexion of the hip.

catheters.

14. Instruct the patient to leave the dressing in place for a minimum of 24 hours, and to check the dressing every few hours for signs of bleeding.
 15. Give the patient adhesive removal packets to assist them in removing the pressure dressing.
 16. Document per SOP
<http://www.cc.nih.gov/nursing/SOPVAD1201.htm>
14. If bleeding is noted, instruct the patient/family member to hold pressure over the site and call the responsible health care provider for further instructions.

XII. ACCESSING SUBCUTANEOUS VENOUS ACCESS DEVICE

A. EQUIPMENT LIST

- Mask
- Sterile field
- Pair of sterile gloves
- Pair clean gloves
- One chlorhexidine and alcohol applicator (3 mL)
- 1 Protective skin barrier swabstick (optional)
- 4 X 4 cotton gauze sponge (optional)
- 2 x 2 cotton gauze sponge (optional)
- 4 x 5 or larger transparent dressing
- blunt cannula
- saline
- Pre-filled syringe containing 100units/mL Heparin
- Injection cap
- 10-mL syringe
- Sterile Steri-Strips
- Right angle non-coring needle with extension tubing

B. STEPS

KEY POINTS

1. Palpate over the site of the implanted device to confirm the silicone septum's location.
2. Clean the site over the VAD and surrounding skin with chlorhexidine and alcohol applicator using a bidirectional scrub. Allow to dry.
3. Put on mask and prepare sterile field with remaining equipment and non-coring needle with extension tubing.
4. Using sterile technique, prepare 10 mL syringe with saline.
5. Put on sterile gloves.
6. Attach the 10 mL 0.9% NaCl syringe to the non-coring needle extension tubing and prime with 1 mL 0.9% NaCl. Do not detach syringe.
7. Stabilize the port with the thumb and index finger of the non-dominant hand.
8. With the dominant hand, position right angle needle above port septum and insert perpendicular to the port septum.
9. Apply steady pressure until the needle touches the base of the port reservoir.
10. With dominant hand, aspirate for a free-flowing blood return.
10. Firm pressure is needed to penetrate the silicone septum. Do not rock or rotate needle once in place as this can damage the septum.
11. If blood return is brown with fibrin clots which may occur when the port has not

been used recently continue to aspirate until bright red blood appears in the syringe.

11. Remove mask.
12. Clamp extension tubing, remove syringe and discard.
13. Attach 10 mL syringe of 0.9% NaCl.
14. Unclamp extension tubing and flush with 10 mL of 0.9% NaCl using push-pause technique.
15. Clamp the extension tubing.
16. If no blood return obtained, reposition patient and instruct to cough and deep breathe or perform valsalva maneuver.
17. If there is still no blood return, flush VAD with 5 mL 0.9% NaCl.
18. If still no blood return, attempt to reaccess using a new non-coring needle.
19. If there is no blood return after two attempts, notify prescriber.
20. Secure the needle to skin with steri-strips.
21. Swab the area which will be underneath the dressing adhesive with protective skin barrier (optional).
22. Apply dressing over SVAD and needle. Form an occlusive seal by pinching the adhesive portion of the dressing around the catheter which extends out from the dressing.
23. Remove mask.
24. If patient is receiving continuous infusion, remove syringe and connect IV tubing to extension tubing. Unclamp extension tubing and regulate IV infusion to prescribed rate.
25. If patient is not receiving continuous infusion, remove syringe and flush VAD with Heparin and attach new intermittent injection cap.
15. If resistance is met, verify needle placement by applying pressure on the needle until the reservoir's base is felt. If there is still resistance, or if not in the reservoir, remove needle and reaccess.
22. Use protective skin barrier only on intact skin.

XIII. DEACCESSING SUBCUTANEOUS VENOUS ACCESS DEVICE

A. EQUIPMENT LIST

- One chlorhexidine and alcohol applicator (3 mL)
- One pair non-sterile gloves
- Sterile gauze pads
- Pre-filled syringe containing 0.9% NaCl
- Pre-filled 5 mL syringe containing 100 units/mL Heparin
- Band-Aid

B. STEPS

KEY POINTS

1. Put on non-sterile gloves.
2. Clamp extension tubing.
3. Clean the intermittent injection cap with alcohol and allow to dry.
4. Attach syringe of 0.9% NaCl.
5. Unclamp tubing and aspirate for free flowing blood return.
6. Flush with 10 mL 0.9% NaCl using “push-pause” technique.
7. Clamp tubing and remove syringe.
8. Attach syringe of heparin.
9. Unclamp tubing and flush with 5 mL heparin.
10. Clamp tubing and remove syringe.
11. Remove dressing.
12. Cleanse the exit site area around the needle with chlorhexidine and alcohol applicator using a bidirectional scrub. Allow to dry.
13. Stabilize the port with the thumb and index finger of non-dominant hand.
14. Withdraw the non-coring needle by pulling straight out, perpendicular to the skin.
15. Apply pressure to the puncture site until bleeding stops.
16. Examine port site for tenderness or erythema.
17. Apply Band-Aid over needle puncture site.
18. Remove gloves.
19. Document per SOP

<http://www.cc.nih.gov/nursing/SOPVAD1201.htm>

XIV. ANTIBIOTIC LOCK THERAPY (ALT)

A. ESSENTIAL INFORMATION

- Antibiotic lock solutions are used to treat bacterial colonization within a VAD lumen. ALT solutions may accompany, but are generally not intended as the sole treatment for systemic bacterial infections.
- The Infectious Disease Service will approve ALT for each patient prior to the Pharmacy dispensing a drug.
- ALT single-use vials will be dispensed as standard unit-dose volume.

B. EQUIPMENT LIST

- Pre-filled syringe containing 0.9% NaCl
- non-sterile gloves
- alcohol prep pads
- Single use ALT vial (obtained from Pharmacy)
- 5 mL syringe

STEPS	KEY POINTS
1. Review medical order.	1. Medical order will identify lumen(s) to be treated. Medical order will also specify if heparin will be used for those VADs that should be heparinized.
2. Inspect pharmacy-prepared antibiotic solution for precipitate.	2. Return to pharmacy if precipitate visualized.
3. Draw up medication into syringe.	3. Volume drawn up will equal catheter's intraluminal volume. It should be noted that in some instances, unit-dose vials will contain a volume excess that should be discarded. Intraluminal volumes can be found directly on the catheter itself or on the CC VAD service note)
4. Clean intermittent infusion cap with alcohol and allow to dry.	4.
5. Attach 10 mL 0.9% NaCl syringe, aspirate until brisk blood return and flush with 10 mL 0.9% NaCl.	5. Prior to instillation of ALT solution, idle catheters should be flushed in accordance with the SOP: Venous Access Devices.
6. Attach drug-filled syringe and flush with appropriate amount of solution (priming volume) using "positive pressure" technique.	6. Positive Pressure Technique - close the catheter clamp while flushing before the syringe completely empties or by maintaining pressure on the syringe plunger while withdrawing the syringe from the injection cap.

	Allow ALT solution to dwell until catheter needs to be used. It is unnecessary to withdraw and discard the ALT solution dwelling in the intraluminal space.
7. Repeat for each lumen to be flushed using a separate syringe.	
8. Document medication administration in approved electronic documentation or other approved record.	
9. Inform patient that a small amount of antibiotic has been placed into their catheter in order to clear any infection.	

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APPENDIX A VAD OCCLUSION VERIFICATION

